# Abdelhalim Amer

## CONTACT INFORMATION

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## EDUCATION

- **Tokyo Institute of Technology**, Tokyo, JAPAN
  - Doctor of Science in Mathematical and Computing Sciences, March 2015
  - Advisor: Prof. Satoshi Matsuoka
  - Rewarded the Seiichi Tejima Doctoral Dissertation Award
- **Ecole national Supérieure d'informatique (ESI)**, Algiers, ALGERIA
  - Engineering degree in Computer Science, July 2010
  - Advisors: Prof. Walid-Khaled Hidouci (ESI), Ahmed Toufik (CNRS LaBRI)

## APPOINTMENTS

- **Postdoctoral Appointee** at Argonne National Laboratory, April 2015 - Present
  Supervisor: Dr. Pavan Balaji
- **Research Assistant** at Matsuoka-Lab, Tokyo Institute of Technology, October 2014 - March 2015
  Supervisor: Prof. Satoshi Matsuoka
  Project: Extreme Bid-Data, funded by JST/CREST
  Duties: Optimize task parallel and hybrid MPI+Threads data intensive algorithms on massively parallel systems
- **Research Aide** at Argonne National Laboratory, IL, U.S.A. April 2014 - September 2014
  Supervisor: Dr. Pavan Balaji
  Duties:
  - Analysis and optimization of a hybrid Breadth First Search (BFS) implementation on large scale systems
  - Advanced MPICH runtime analysis when multithreaded communication takes place
  - Design, implementation, and evaluation of solutions to the multithreaded MPICH runtime contention on hierarchical memory systems
- **Thesis-Parts Appointment** at Argonne National Laboratory, IL, U.S.A. September 2013 - November 2013
  Supervisor: Dr. Pavan Balaji
  Duties: Characterize Lock Contention in MPICH
- **Intern** at LCSI Laboratory, Ecole national Supérieure d'informatique (ESI), Algiers, ALGERIA, September 2009 - July 2010.
  Duties: Design and implementation of a video streaming framework over peer-to-peer networks using scalable video coding (SVC) and real-time streaming protocols.

## Research Scope

My research falls under the parallel and distributed computing landscape. More specifically, I focus on parallel runtime systems to accommodate programming models and applications in massively parallel environments. This involves dealing with communication runtimes and their interaction challenges with threading models, such as in the context of fine-grained MPI communication and hybrid MPI+threads programming on multi- and many-core systems.

## Current Projects

- MPICH is a high performance and widely portable implementation of the Message Passing Interface (MPI) standard. While I am involved in several aspects related to MPI and the MPICH implementation, I particularly focus on multithreaded communication performance.
- Argo is an Exascale operating system and runtime research project. I am responsible for low level optimizations of Argobots, the runtime layer, and its interaction with the communication layer such as MPI.

## Past Projects

- Extreme Big Data (EBD) aims at improving the data processing capabilities of current systems in order to handle data that will be generated by future applications, which is expected to be of extreme scale an complexity. My role was to investigate and improve hybrid MPI+threads runtimes to better support communication and data intensive algorithms such as graph processing applications.

## Publications

- Refereed Conference Publications

  [1] Abdelhalim Amer, Huiwei Lu, Yanjie Wei, Pavan Balaji and Satoshi Matsuoka. *MPI+Threads: Runtime Contention and Remedies*. ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming 2015 (PPoPP'15). Feb. 7-11, 2015, San Francisco, California. [paper] [slides]

  [2] Abdelhalim Amer, Naoya Maruyama, Miquel Pericàs, Kenjiro Taura, Rio Yokota, and Satoshi Matsuoka. *Fork-Join and Data-Driven Execution Models on Multi-core Architectures: Case Study of the FMM*. International Supercomputing Conference 2013 (ISC'13), 255-266. [paper] [slides]

  [3] Abdelhalim Amer, Ahmed Toufik, Walid-Khaled Hidouci, and Satoshi Matsuoka. *Using Bittorrent and SVC for efficient video sharing and streaming*. IEEE Symposium on Computers and Communication 2012 (ISCC,12): 537-543. [paper] [slides]

- Refereed Workshop Publications

  [4] Daniel Ellsworth, Tapasya Patki, Swann Perarnau, Sangmin Seo, Kazutomo Yoshii, Abdelhalim Amer, Rinku Gupta, Judicael Zounmevo, Henry Hoffman, Allen Malony, Martin Schulz, and Pete Beckman. *Systemwide Power Management with Argo*. To appear at the Workshop on High-Performance, Power-Aware Computing (HPPAC) 2016

  [5] Abdelhalim Amer, Huiwei Lu, Pavan Balaji, and Satoshi Matsuoka. *Characterizing MPI and Hybrid MPI+Threads Applications at Scale: Case Study with BFS*. Workshop on Parallel Programming Model for the Masses (PPMM); held in conjunction with IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing (CCGrid). May 4, 2015, Shenzhen, China. [paper] [slides]

  [6] Miquel Pericàs, Abdelhalim Amer, Kenjiro Taura and Satoshi Matsuoka: *Analysis of Data Reuse in Task-Parallel Runtimes*. 4th International Workshop on Performance Modeling, Benchmarking and Simulation of High Performance Computer Systems (PMBS'13), Denver, November 2013. [paper] [slides]

[7] Miquel Pericàs, Abdelhalim Amer, Kenjiro Taura and Satoshi Matsuoka: *Analysis of Data Reuse in Task-Parallel Runtimes*. Lecture Notes in Computer Science, Springer, High Performance Computing Systems. Performance Modeling, Benchmarking and Simulation, pp 73-87, 2014. [paper]

- Invited Talks
  - *Towards an Extreme Scale Multithreaded MPI*, presented at Tokyo Institute of Technology, University of Tsukuba (as a guest of the Japan-Korea HPC Winter School), University of Tokyo, and RIKEN, Kobe, Feb 2016.
  - *MPI+Threads: Thread-Safety Optimization Perspectives*, at the 4th Joint Laboratory on Extreme Scale Computing (JLESC), Bonn, Germany, December 2015.
  - *Multithreaded MPI Communication: Opportunities and Challenges*, at the Tongji-ANL Workshop, Tongji University, China, May 2015

## PROFESSIONAL ACTIVITIES

- Program Committee for International Conferences and Workshops
  - International Conference on High Performance Computing, Data, and Analytics (HiPC), 2016
  - International Conference on Cloud Computing and Big Data (CCBD), 2016
  - Programmability and Architectures for Heterogeneous Multicores (MULTIPROG), 2016
  - International Conference on Cloud Computing and Big Data (CCBD), 2015
- Technical Referee for International Journals
  - IEEE Transactions on Cloud Computing (TCC), 2016
  - Elsevier Journal of Parallel and Distributed Computing (JPDC), 2016
  - International Journal of High Performance Computing Applications (IJHPCA), 2015
  - Elsevier Parallel Computing Journal (ParCo), 2014
- Technical Reviewer for International Conferences and Workshops
  - International Conference on Supercomputing (ICS), 2016
  - IEEE International Parallel and Distributed Processing Symposium (IPDPS), 2016
  - International Symposium on Cluster, Cloud, and Grid Computing (CCGrid), 2016
  - The International Workshop on Accelerators and Hybrid Exascale Systems (AsHES), 2016
  - ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC), 2015
  - IEEE International Conference on Parallel and Distributed Systems (ICPADS), 2015
  - International Conference on Parallel Processing (ICPP), 2015
  - International Conference on High Performance Computing (HiPC), 2015
  - International Conference for High Performance Computing, Networking, Storage, and Analysis (SC), 2014
  - International Conference on Supercomputing (ICS), 2013
  - ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC), 2013
  - IEEE International Parallel and Distributed Processing Symposium (IPDPS), 2013
  - IEEE International Conference on Parallel and Distributed Systems (ICPADS), 2013
- Chairmanship
  - European MPI Users' Group Meeting, 2017 (EuroMPI/US) (Web Chair)
  - IEEE International Conference on Cluster Computing (Cluster), 2015 (Session Chair)

- International Workshop on Programming Models and Applications for Multicores and Manycores (PMAM), 2015 (Session Chair)

- Students Advising/Mentoring
  - Alex Brooks, Ph.D. student, Department of Computer Science, University of Illinois at Urbana-Champaign, Illinois, USA: *Analyzing the Overhead in User-level Threading Libraries*. Period: 05/2015-08/2015. (Mentor)

- Other Activities
  - Moderator of the hpc-announce@mcs.anl.gov mailing list since April 2015

- Memberships
  - ACM professional member since 2015
  - IEEE professional member since 2015
  - ACM SIGHPC member since 2012
  - ACM student member since 2011
  - IEEE student member since 2011

## AWARDS

- Seiichi Tejima Doctoral Dissertation Award, 2016, Tokyo Institute of Technology
- Japanese Government (MONBUKAGAKUSHO:MEXT) Scholarship for Graduate Studies (April 2010 - September 2014)
- Algerian Government Scholarship for University Studies (September 2005 - July 2010).